Lotem 800 Family

Power Distribution Box
506E4E249

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RE37,376	5,325,217	5,532,728	5,742,743	5,996,499	6,158,345	6,353,216
4,558,302	5,339,176	5,561,691	5,764,374	5,998,067	6,159,659	6,366,339
4,743,091	5,343,059	5,568,595	5,764,381	6,003,442	6,164,637	6,371,026
4,992,864	5,355,446	5,576,754	5,771,794	6,014,471	6,180,325	6,377,739
5,049,901	5,359,451	5,579,115	5,785,309	6,016,752	6,181,362	6,387,597
5,079,721	5,359,458	5,592,309	5,813,346	6,031,932	6,181,439	6,396,422
5,103,407	5,367,360	5,594,556	5,818,498	6,043,865	6,186,068	6,396,618
5,111,308	5,384,648	5,600,448	5,854,883	6,060,208	6,189,452	6,407,849
5,113,249	5,384,899	5,608,822	5,861,904	6,063,528	6,191,882	6,414,755
5,122,871	5,412,491	5,615,282	5,861,992	6,063,546	6,204,874	6,422,801
5,124,547	5,412,737	5,625,766	5,875,288	6,072,518	6,208,369	6,435,091
5,132,723	5,420,702	5,636,330	5,894,342	6,090,529	6,214,276	6,441,914
5,150,225	5,420,722	5,649,220	5,900,981	6,096,461	6,217,965	6,450,092
5,153,769	5,459,505	5,650,076	5,934,196	6,098,544	6,260,482	6,456,396
5,155,782	5,473,733	5,652,804	5,942,137	6,107,011	6,266,080	6,476,931
5,157,516	5,481,379	5,680,129	5,946,426	6,112,663	6,266,134	6,477,955
5,208,818	5,488,906	5,691,823	5,947,028	6,115,056	6,267,054	6,509,903
5,208,888	5,497,252	5,691,828	5,958,647	6,121,996	6,268,948	
5,247,174	5,508,828	5,696,393	5,966,504	6,130,702	6,283,589	
5,249,067	5,509,561	5,699,174	5,969,872	6,134,393	6,295,076	
5,283,140	5,517,359	5,699,740	5,973,801	6,136,509	6,299,572	
5,291,273	5,519,852	5,708,736	5,986,819	6,137,580	6,318,266	
5,323,248	5,526,143	5,713,287	5,995,475	6,147,789	6,352,816	

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Introduction

A Power Distribution Box (PDB) takes a high-capacity or medium capacity power feed and splits it into several lower capacity feeds.

For example, the PDB in Lotem 800 Family platesetters, makes use of a transformer and rectifier bridge to convert a three phase input into lower feeds (24V and 42V DC). It then distributes these lower capacity feeds to the drum motor, interlocks, the E-box and other additional accessories.

Lotem Quantum platesetters contain a regulated power supply for 24V and 48V rather than a transformer. The Lotem Quantum PDB also contains the TH2 write laser 48V power supply.

Although there are different electric parts and contents between the various PDBs, the concept remains the same.

This document includes general information and electrical specifications for PDBs in Lotem 800 Family platesetters.

Overview

Mechanical

The Lotem 800 Family PDB can be mechanically broken down into the following three main parts:

Front Door

Box

Rear Cover

Front Door

The front door contains the following:

- Main power cord
- Main circuit breaker (25 amp.)
- Drum motor circuit breaker (15 amp)
- Drum vacuum pump circuit breaker (10 amp)
- Interior metal cover for high voltage protection
- Cooling fan (220v)
- Interlock board
  (unique to the Lotem 800 Quantum new PDB - version 506E4E249)

Box

The box contains the following:

- CTP power distribution board
- Drum driver board
- Interlock board (Lotem 800 fiber head and Lotem 800 Quantum)
- Additional relay connected between the distribution board phases out and the drum driver (unique to Lotem Flexo)

Rear Cover

The rear cover contains the following:

- Capacitors
- Rectifier bridge
- Transformer*

*Quantum 800 platesetters, with a PDB version 506E4E249, do not have a transformer, but instead have a regulated DC 24V and DC 42V power supply. This unit also contains the DC 48V power supply for the TH2 head.

Electrical

The Lotem 800 Family PDB can be electrically broken down into the following seven main parts:

Mains

Circuit Breakers (CB)

Line Filters (LF)

Power Transformer and Rectifier Bridge

CTP Power Distribution Board

Drum Driver

Interlock Board

Mains

The mains for the Lotem 800 PDB family are three phase 110V (208V phase to phase).

Circuit Breakers (CB)

The main circuit breaker (CB) for the Lotem 800 PDB is a four pole type (R, S, T, N). The drum and drum vacuum pump CB is a three pole type.

Line Filters (LF)

The line filter (LF) for the Lotem 800 PDB is a five pole type (R, S, T, neutral, ground).

Power Transformer and Rectifier Bridge

- Three phase transformer and rectifier bridge. DC output 24V and 42V
- The PDB 506E4E249 unit does not have a transformer, but instead has a regulated power supply of 24V and 48V. The TH2 write laser has an additional 48V power supply.

CTP Power Distribution Board

- The CTP power distribution board controls and distributes the AC high voltage by SSR to all the required components: Drum (via drum driver), L-box, E-box, vacuum pumps. The board also distributes DC 24V, 24V and 42V or 48V interlocked, by means of an on board relay.
  Additional abilities, such as solenoid drives (24V) and digital sensor reading exist on this board too (including the drum motor hall sensors).

  The on board CPU executes all board activities directed from the host via an RS485 communication port.
- Each type of platesetter, (Lotem fiber, Lotem Quantum, Lotem Flexo) uses a different type of board (each having their own different catalog number). The variation of boards reflect minor functionality changes between the different platesetters.

Drum Driver

The drum driver is responsible for the drum drive. The driver has a three phase 110Vac (208V phase to phase) input, and an output of 300V DC three phase related to motor hall effect sensors. The distribution board controls the input power and the command originates from MCF (fiber platesetters) or TMCE (Quantum platesetters).

Interlock Board

- The interlock board is responsible for preventing any exposure to the platesetter's laser beams. When the interlocks are open, the board cuts the mains to the L-box (Lotem fiber) or to the write laser 48V power supply (Quantum). The board contains two main relays, controlled by two interlock loops.
- There are four active interlock board types:
  503C2L461 - Controls only the laser power (Lotem fiber non Omron interlocks).
  503C2L971 - Motor interlock is combined with laser interlock (Lotem fiber and Quantum - Omron interlock switches).
  503C2L683 - Controls only the laser power (Lotem Flexo non MROM interlocks).
  503C1C112 - Motor interlock is combined with laser interlock (Lotem Flexo - Omron interlock switches).

Operating Principle

The three phase 208V mains are transferred to the line filter via a 20 Amp main CB. The line filter output, three phase and neutral output are distributed to the CTP board:

- Directly to J13. Three on board, main SSRs (one for each phase) are connected accordingly. Parallel connection for phase (R) to an on board transformer related to neutral. Transformer output is 20V AC and is used after rectification to turn on the three SSR'S, while pressing the platesetter's On/Off switch.
- From line filter via drum vacuum 10 Amp CB to J11, followed by three on board SSRs (one for each phase).
- From line filter via drum motor 15 Amp CB to J12 followed by three on board SSRs (one for each phase).
- From line filter to cooling fans.
- Pressing the On/Off switch, while the main CB is on, activates the main SSRs to enable AC 208V to flow through two outlets; the E-Box being connected to one of the outlets. Three phases are also transferred to the power transformer. The transformer output 24V & 42V DC is now alive. If laser interlock loop is closed 208V on the L-box output should also be available.
- All other switching activities such as 24 & 42V interlock, vacuum pump, drum motor, are totally dependant on the CTP board digital part.
- CTP board digital part activity is totally dependant on the DC 12V supply from theE-box. On board DC 12V to 5V regulator is used to provide the basic working conditions.
- The CTP board, which is CPU based, requires a communication port. Therefore a RS485 port (NUC via M.B.) is used to communicate with Lotem Controller.
- When the E-Box is on and a 12V supply to CTP board is flowing:

  (i) On board green LED, marked 5V, is working and will be on.

  (ii) On board green LED, marked CPU, will start flickering (FAST).

  (iii) If motor interlock loop is closed (doors are closed or defeater is installed) the 24 & 48V interlock will be available.

  (iv) All other functionalities depend on Lotem Controller.

When the application is On (ready), all board functionalities can be applied.

Note: Some activities are activated/deactivated by other activities and/or are dependant upon the status of the sensor.

Solenoids

- Four solenoids output the 24V DC drive.
- The output of the solenoids depends upon the drum speed. A low speed signal emits from the distribution board via the motor hall sensors. If the drum speed is above a specific value, the solenoids will not be activated. This drum speed, however, is not accurate because it is taken from the motor hall sensors and not from the encoder.

Vacuum Pumps

- Two outputs, three phase 110VAC (208V phases to phase) are used to activate the drum pumps.
- Each phase on each output is enabled by a different SSR while all three SSRs are switched at one time.

Drum Motor

- The distribution board is responsible for transferring three phase 110V via three SSRs to the drum driver board by host request.
- Drum activity is H/W enable/disabled /protected (distribution board) and depends on the platesetter status and state of the detectors.

1. All three phases are functioning.
2. Motor & laser interlock loops close. SSRs will not be switched on if the motor interlock loop is open. Defeating the motor interlock system while the doors are open (laser interlock loop open) will enable the SSRs switching, if all the remaining protectors are functioning. At this stage the drum rotation will be enabled but it will limited to a speed value. The speed value is determined by the Reg. parameter.
   The full drum activities can be only be applied when both the motor and laser interlock loops are closed.
3. Fly off signal: When this signal appears it is latched inside distribution (H/W) and it will immediately switch off the three SSRs causing the drum to lose power. The fly off signal input is a latched Local3 board output signal. The input to Local3 board are the two fly off switches (NC) in front of the drum. The normal state of fly off input and local3 output is 1.
   A change in the status of one of these switches (even if only temporary) will be reflected on the Local3 board output, by changing the output state to 0. This output will remain 0 until the platesetter is reset. This change will be latched on distribution board and will remain until the platesetter is reset.
4. Vibration: This input will immediately switch off the three SSRs and the drum will lose power if it begins to vibrate. This input is latched too, inside the distribution board. Two switches (NC) located on each side of the drum base, connected in serial, set this input 0 (GNG). Vibration will open one or both of the switches and this will change the input to 1. This change will be latched. In

this case the drum will lose power. No drum activities will take place until the board has been reset.

There is a functionality difference for this input between the different platesetter types, distribution board catalog numbers and/or REV.
Lotem fiber distribution board 503C2L049Q Rev B: Vibration detection starts from zero RPM.
Lotem fiber distribution board 503C2L049Q Rev C: Vibration detection starts from 200 RPM.
Lotem Flexo distribution board 503C2L605P Rev C: Vibration detection starts from zero RPM.
Lotem Quantum distribution board 503C1C064S Rev D: Vibration detection starts from 200 RPM. (No vibration switches connected and this input is shorted to GND).

5. Motor temperature input. This input should be at level 1 in order to enable the motor. Running 5V via motor temperature sensor to this input will enable drum activities. If the motor temperature exceeds the Max allowable, the sensor will be open and the temperature input will be set to 0, causing the drum to stop. This is a distribution board input while the output is drum driver input. A red LED marked *inhibit* on the drum driver indicates that the motor temperature has been exceeded.
6. Drum driver inhibit. This is a distribution board input, which is combined with motor temperature input. This option exist only exists on board 503 …… Rev D, used on Quantum platesetters. The inhibit signal is a TMCE output. A red LED marked *inhibit* on the drum driver indicates that the temperature has been exceeded.
7. Drum driver temperature. This sensor is located on the drum driver board to protect the board. A red LED on the drum driver indicates that the temperature has been exceeded.
8. Drum motor command: This is a +/- 2V input to the drum driver via the distribution board in order to rotate drum in both direction. The MCF board on fiber platesetters is responsible for this command while on Quantum platesetters, the TMCE board is responsible.
9. Drum motor Hall sensors: Three Hall sensor inputs on the distribution board with parallel connection to drum driver. The distribution board uses the sensors to produce the low speed signal while the drum driver switches phases to drum motor in accordance to the Hall sensors.
10. Drum driver phases- buffer relay (unique to Flexo platesetters)
Due to safety requirements (when manually loading plates onto the drum etc.), an additional relay is located between the distribution board to the drum driver board. This cuts the drum driver power thus ensuring that the drum is stationary when the door is open. The interlock board is responsible for activating this rely only when all doors are closed. (A motor defeater will not enable drum activities.)
11. Drum speed limitation (unique to Flexo platesetters). Drum speed is H/W limited to approximately 300 to 330 RPM.

Interlock System

There are two modes of operation for the interlock system: both systems are pure hardware with software backup:

Mode I: Interlock Boards 503C2L461 / 503C2L683

Mode II: Interlock boards 503C2L971 / 503C1C112

Mode I: Interlock Boards 503C2L461 / 503C2L683

There are separate switch systems for the laser and motor interlocks. The motor interlock has one loop and the laser interlock has two loops. Every platesetter door, cover or cassette inlet, contains a single switch box or magnetic switch for the motor interlock system and/or a double switch box for the laser interlock system. The motor interlock can be defeated. The laser interlock system cannot be defeated due to safety requirements.

Each box is located according to its safety needs. Doors or covers press the interlock box when close. The motor interlock loop, which is directly connected to the distribution board, activates the motor interlock relay and enables 24 and 42 interlock voltage - both these are necessary for platesetter operation.

In addition there is a safety switch located inside the platesetter, in front of X/Y system, in a serial electrical connection to the motor loop.

Laser interlock switches are connected to the interlock board to activate two relays that transfer 220V.

Serial switches connections, (each switch on each door is in a different loop) for each laser interlock loop with additional electrical connection have the ability to identify a failure of one or more of the switches. Running GND through the laser and motor interlock switches closes the loops.

Each laser interlock box or motor interlock box has detector to monitor door status. Opening any door that contains a laser interlock box should cut the 220V leading to laser power supply (L-box). A failure with one of the switches will activate the buzzer on the interlock board with a three second delay. This feature is unique to the board's electrical circuit and ensures the opening of the two interlock relays in this case. The buzzer will be activated even if one of the laser loops is closed whilst the other remains open. The buzzer emits a sound until the power is shut down. Opening any door that contains a motor interlock box will stop any platesetter motor operation by disabling the 24 and 42/48V. However, a defeater can be used to enable normal motor operation (not including drum on flexo). Not that a defeater is needed on each open door.

Two detector inputs located in the distribution board, monitor the status of the laser interlock relays.

Mode II: Interlock Boards 503C2L971 / 503C1C112

This mode is used on platesetters with Omron interlock switches.

- The interlock board is responsible for activating the motor interlock relay on the distribution board when all the doors are closed.
- Running 24V instead GND through the Omron interlock switches to activate the interlock relays.
- One interlock box (motor) to defeat any platesetter motor operation when any of the doors are open (Not including drum on flexo). This defeater is connected to the interlock board that closes the motor interlock loop on the distribution board. When the door is closed, it should not press on this interlock box and mechanically, the door can not be closed if a defeater is installed.
- An additional interlock box (focus) to defeat, is located on Quantum platesetters only. This interlock box enables the TH2 focus when the door is open. A defeater must also be installed in the motor box, to enable the focus. This box must not be pressed when the cover is closed. When a defeater is installed the cover cannot be closed.
- Two detector inputs are located in the distribution board to monitor the status of the interlock relays.
- The safety switch located inside the platesetter, in front of the X/Y system, is only activated when the door is open and a defeater is installed while cassette inlet interlock is not active. When all the doors are closed, the safety switch is not in the loop but the cassette interlock is in the loop.